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A Vector Autoregressive Analysis of Policy and Non-Policy Predictors of Foreign Direct Investments in Nigeria

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Abstract:
Foreign direct investment (FDI) has remained the most stable form of capital flows from capital abundant economies to capital deficit countries. This has prompted several studies into its drivers as the recipient countries strive to maintain large hold of it. This paper explores the policy and non-policy predictors of FDI inflows to the Nigeria with the years under consideration spanning from 1980 to 2015. The specific objectives of this paper are to assess the effects of degree of openness, exchange rate, unemployment, electricity generation and gross domestic product on FDI inflows to Nigeria. The datasets for the underlying variables were sourced from the Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics and International Energy Statistics and analyzed using Vector Autoregressive (VAR) technique. The Augmented Dickey-Fuller test result for stationarity indicates that all the variables stationary at first difference. Evidences from the empirical analysis of the economic time series reveal that the lagged value of FDI is significant in driving the current value of FDI in Nigeria during the study period. This is suggestive that the location of foreign direct investment in Nigeria is a reflection of imitative decision of other firms in the oligopolistic market conditions. However, gross domestic product, exchange rate and electricity generation exerted positive, but insignificant effects on FDI during the period studied. Conversely, degree of openness and unemployment had an insignificant negative influence on FDI. The Granger causality test reveals that the variables in the model jointly Granger caused FDI during the years under consideration, indicating that they collectively have predictive power for FDI during the period studied. It was uncovered from the variance decomposition estimates that exchange rate has the highest predictive for FDI for a sample of 8-years period. In view of findings, this paper recommends that government should ensure that the existing foreign direct investments are protected and offered necessary incentives in order to attract more foreign investments in key sectors of the Nigerian economy.

1. Introduction

The debates in business and academic cycles with regard to flow of resources have largely focused on the drivers of foreign direct investment (FDI) to capital scarce countries from capital abundant locations. As an integral part of an open and effective international economic system, FDI has remained a key determinant of economic development (Ebiringa and Emeh, 2013). This is akin to the assertion of Walsh and Yu (2010) that FDI is more related to long-run growth and development than other types of capital flows. Aside narrowing the saving-investment gap in capital-deficit countries, numerous researches indicate that FDI promotes employment generation; enhances managerial skills and boost technological transfer among others. Most economies, especially developing ones have increasing seen FDI as a solution to their structural macroeconomic problems, source of wealth creation and modernization of the domestic economy.

Over the years, many countries have adopted outward-oriented economic reforms with a view to attracting foreign investments. These economic reforms are often integrated into the stabilization policies geared towards optimizing the inflow of FDI to the domestic economy. Gottschalk (2001) asserts that the main argument for capital flows to developing economies revolves around push and pulls factors. While the former is concerned with movements in international interest rate and internationalization of savings, the latter is directly related with the economic, socio-political and structural conditions of the recipient countries.

Like other developing economies, Nigeria has been mobilizing foreigners on to invest in the country through the adoption of outward policy reforms and provision of some incentives. The rationale for encouraging FDI inflows to Nigeria is to bridge the savings-investment gap and in turn engender sustainable growth of the economy (Oba and Onula, 2013). Consequent upon this, inflows of FDI in Nigeria have witnessed a dramatic turnaround compared to what is obtainable in other sub-Saharan African countries. In 2007, Nigeria accounted for 70 percent and 11 percent of total FDI inflows to sub-Saharan region and entire African continent respectively (Dinda, 2009). According to Sekkat and Veganzones – Varoudakis (2007) as cited in Anyanwu (2011), fundamental economic factors, trade and the exchange market policies and other aspects of the investment climate are the key determinants of inward inflow of FDI. It is important to note that the abundance of labour resources in the developing economies has the capacity of facilitating the inflow of FDI with labour-intensive technique. This is in accordance to the Kojima theory which assumes that one of the rationale for outward

foreign direct investment is the need to switch to labour intensive activities from location where labour cost is high to locations with low cost of labour resources..

The quest to boost investment in various sectors of the Nigerian economy in the accordance with the perspective plan of vision 20:2020 has focused government's attention on inflow of foreign direct investments. This has necessitated the adoption of policy actions capable of stimulating inflows of foreign direct investments. Deliberate steps have been taken by the government to provide enabling environment for FDI to thrive (Obida and Abu, 2010). Despite these efforts FDI inflows to Nigeria has not been very impressive as it only remained dominant in the oil sector. Between 1970 and 2006, oil sector alone accounted for 90 percent of the total inflow of FDI to Nigeria (Abubakar and Abdulahi, 2013). This has raised concern among policy makers and other relevant stakeholders in the Nigerian economy. Again, the swings in the inflows foreign direct investments to Nigeria have dominated public discourses in recent years. There have been competing and conflicting arguments in both business and academic cycles on the predictors of inward foreign direct investments in Nigeria. In the light of the above, this paper employed a more elaborate approach by focusing on policy and non-policy drivers FDI in Nigeria.

1.1. Statement of Problem

The growing emphasis on the internationalization of the domestic economy as a gateway to the global economic environment has shifted attention to the inflow of foreign direct investment (FDI). Several researches indicate that inflows of FDI to capital deficit countries have been on an unequal basis. While some countries largely encourage inflow of FDI, others attract low proportions of FDI inflows (Ebiringa and Ezeh, 2013). The paucity of FDI in Nigeria has remained a source of concern to the relevant stakeholders. The adoption of Structural Adjustment Programme (SAP) in 1986 failed to allay the fears expressed by foreign investors as trade liberalization and deregulation policies associated with it seem not to achieve ultimate objective of mobilizing enough FDI to adequately narrow the prevalent savings-investment gap in Nigeria. Evidences from many studies indicate that Nigeria lags behind some African countries in terms of inflow of FDI. Specifically, inflow of foreign direct investment to Nigeria between 2001 and 2007 was low compared to that South Africa as Obiechima (2010) posits that within this period, inflow of foreign direct investment to Nigeria stood at US $33.006 million while that of South Africa almost doubled that of Nigeria as it stood at $US 64.237 billion. The fluctuations in the general price level also tend to limit the ease of doing business in Nigeria. This often leads to increase in the cost of production with adverse effects on the output and profitability of the foreign firms. More importantly, the decline in the flow of FDI to Nigeria has raised questions such as: what are the key determinants of inward FDI to Nigeria? Why does Nigeria lag behind other leading economies in terms of attracting FDI? Thus, the thrust of this paper is provide appropriate answers to these questions and find other push factors for inward FDI to Nigeria.

2. Review of Related Literature

2.1. Theoretical Literature

2.1.1. Eclectic Theory

The eclectic theory pioneered by Dunning (1980) is an integration of internalization, oligopolistic and location theories. It is often referred to as the OLI (Ownership, Location and Internalization) paradigm. According, to Dunning, (1980), the extent, form and pattern of international operations of firms are predicated on three main advantages. Nayyar (2014) outlines these advantages as: competitive edge enjoyed by firms of one nationality over those of another nationality in any given market or sets of markets promotes investment abroad; the extent to which firms view internalization to be in their best interest motivates them to invest across their national boundaries and the choice of firms in location their productive activities outside their national boundaries.

Thus, the ownership, location and internalization advantages are the key motives of FDI flows.

Ownership advantages which encompass tangible and intangible assets confer competitive edge on a firm over its domestic and foreign rivals. Reduction in firm's production costs and effective competition with rivals are often associated with ownership advantages (Nayak and Choudhury, 2014). On the other hand, location advantages are concerned with the ability of firms to avoid market imperfections in their host countries. It measures the ability of firms to depend on their efforts for successful operations rather than on external markets. The broad-based acceptance of the eclectic theory stems from its significant contribution to the existing FDI literature through the blend of some complementary theories and identification of the drivers of multinational companies to their host countries. Unfortunately, the eclectic theory is criticized for including many variables which constraints its operational practically. Additionally, Shin (1998) faults the applicability of the eclectic paradigm to flows of Korean firms' investments to the European Union due to their lack of the three key advantages outlined by the OLI paradigm.

2.1.2. Kojima Theory

The seminal work of Kojima (1975) provides an insight into the motives of foreign direct investment by Japanese firms. The Kojima hypothesis identifies two main motives for the outward flows of Japanese FDI. These include the desire to exploit natural resources which are unavailable or not producing optimally in the home country and the intention to swift to labour-intensive production techniques which are prevalent in the recipient country. Contrarily, Kojima explained that foreign investment by American firms are mostly attracted to oligopolistic, capital intensive and technologically improved industries abroad. Kojima categorized FDIs into trade-oriented and anti-trade oriented. He further explained that Japanese FDIs are trade-oriented as they promote welfare in both source and recipient countries while American FDIs are anti-trade oriented as they generate negative spill-over effects on trade due to

undue restructuring of industries in both countries. The main thrust of Kojima hypothesis is that flows of FDI are predicated on differences in the costs of labour and capital. Low cost of labour in developing countries provides incentive to shift production to these areas to explore new financial opportunities (Cywinski and Harasym, 2013). The availability of low costs of labour resources in developing countries is necessitated by excess labour supply over its demands which causes wage rate to decline. This is illustrated graphically below:

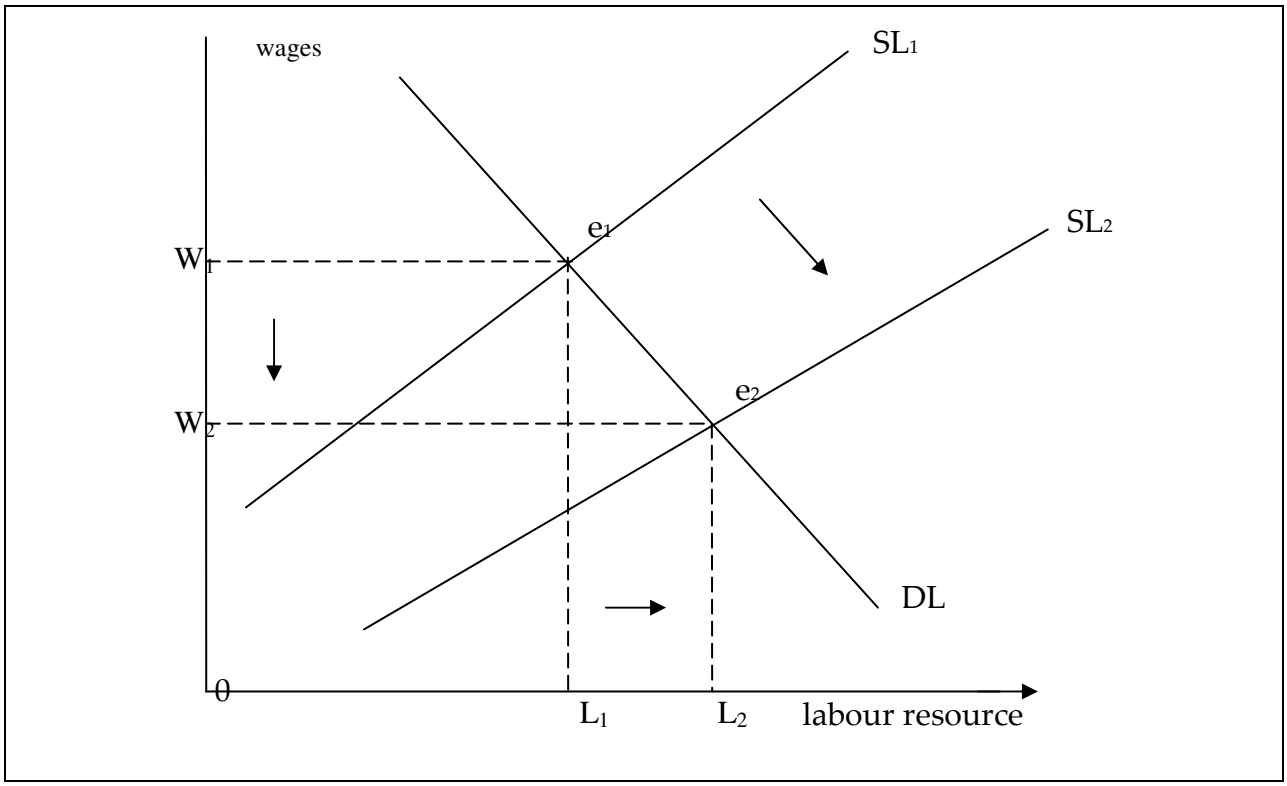

Figure 1: Wage elasticity of labour supply

Figure 1 shows the wage elasticity of labour supply. As the labour increases, the labour supply curve shifts outward from SL_1 to SL_2 which causes a decline in wage rate from W_1 to W_2. The fall in the wage rate which is necessitated by increase in the number of persons willing and able to work provides incentive for flows of FDI from countries with high wage rate to countries where wage rate is relatively low due to the abundance of labour resources. Although Kojima theory offered explanations for the behaviour of all segments of FDI, it is criticized for its failure to clearly distinguish between trade-oriented and anti-trade oriented foreign investments.

2.2. Empirical Literature

The determinants of foreign direct investment have attracted the attention of many researchers worldwide. The empirical studies undertaken by these researchers have led to varying results.

Ebiringa and Emeh (2013) assessed the determinants of foreign direct investment in Nigeria. The regressors include in the model are exchange rate, inflation rate, gross domestic product, stock market capital ratio and interest rate. The analytical techniques employed by the study include stationarity test, cointegration test, variance decomposition and error correction model. It was evidence from the findings that all the regressors individually and jointly generated long-term significant effects on inflow of foreign direct investment in Nigeria. Therefore, the study suggested for the stabilization of macroeconomic performance by straightening the capacity of economic planning to restore foreign investors' confidence in Nigeria.

Abbas and Mosallamy (2016) examined the drivers of foreign direct investment flows to developing economies with particular focus on the Middle East and North Africa (MENA) region. The study covered the period of 2006 to 2013 using market openness, infrastructure, and political stability, availability of resources and previous value of FDI as measures FDI determinants. The Ordinary Least Square (OLS) was adopted to analyze the panel data obtained from the selected countries. The result shows that infrastructure, human capital, lagged FDI and market openness are the significant drivers of FDI during the study period. This is a pointer that inflow of FDI to MENA region is ultimately market-driven. Based on the findings, the study recommended for MENA countries to utilize these advantages to boost inflow of FDI.

Obida and Nurudeen (2010) evaluated the determinants of FDI in Nigeria over the period of 1979 to 2006. The analytical tool followed error correction technique and the findings indicate that market size, deregulation, exchange rate depreciation and political instability are the key determinants of FDI flows to Nigeria. The study however, suggested for the sustenance of the democratic process and decrease in government intervention in the economy.

Walsh and Yu (2010) investigated the drivers of FDI to primary, secondary and tertiary sector investments in emerging market and developing economies. The Generalized Method of Moments (GMM) approach was employed to analyze the panel data obtained from the sampled countries. Evidences from the results indicate that FDI flows into the secondary and tertiary sectors largely depend on the host countries' income levels, exchange rate valuation and flexibility of labour market among others. These results vary among the countries. The study recommended for labour markets liberalization and infrastructural development in order to reap the benefits of FDI inflows.

Anyanwu (2011) explored the determinants FDI inflows to Africa between1980 and 2007. The study employed a multivariate regression model to estimate the link between FDI and its outlined determinants. It was observed from the results that market size, openness to trade, natural resource endowment and government demand impacted positively on FDI flows to Africa. Contrarily, FDI flows are negative related with higher financial development. The study recommended for an improvement in the quality of domestic financial system.

Gharaibeh (2015) assessed the drivers of foreign direct investment inflows to Bahrain from 1980 to 2013. Time series data from the United National Conference on Trade and Development (UNCTAD) were used for the analysis. The analytical approach adopted by the study is Ordinary Least Squares (OLS). The results reveal that government consumption expenditure, inflation rate, annual interest rate and labour force size significantly impacted on capital inflows while gross domestic product growth rate, index of export and exchange rate generated a positive but insignificant influence on foreign direct inflows to Bahrain. The study concludes that welfare measures are the main determinants FDI inflows to Bahrain during the study period.

Sichei and Kinyondo (2012) empirically investigated the factors that stimulate inflows of foreign direct investment for a sample of 41 African countries between 1980 and 2009. The estimation technique followed a multiple regression approach of the Ordinary Least Squares (OLS). It was evident from the findings that real GDP growth, natural resources and international investment agreements are the major determinants of FDI flows to the sample countries during the period under investigation.

Aziz, Sarkar and Mahmud (2014) evaluated the factors that drive foreign direct investment flow to Bangladesh between 1972 and 2010. The Ordinary Least Square (OLS) approach was applied for the analysis of the required data. The variables included in the model as measures of factors influencing FDI include real GDP, trade balance and productivity of labour. The result shows that real GDP and trade balance generated positive and significant influence on FDI inflows while labour productivity exerted a positive, but insignificant effect on FDI inflows to Bangladesh. The study suggested for the development of more transparent trade policy and appropriate regulatory mechanism.

Williams (2015) appraised the drivers of foreign direct investment in Latin America and the Caribbean using panel data that spans through the period 1975-2005. The study primarily intended to investigate if Latina America and the Caribbean (LAC) vary from non-LAC regions in terms of drivers of foreign direct investment. Both contemporary and time lagged variable effects regressions were employed by the study to estimate the determinants of FDI in these regions. Evidences from the results indicate that stock of infrastructure is the key determinant of FDI to Latina America and the Caribbean while high debt profile contract FDI inflows to non-Latin America and the Caribbean region. The study suggested for the Latin America and the Caribbean to focus on expanding the stock of capital as an incentive to FDI inflows.

3. Methodology

3.1. Model Specification

This paper employed a Vector Autoregressive (VAR) model which is built on the eclectic and Kojima theories of foreign direct investment. The eclectic theory of FDI pioneered by Dunning (1973) posits that ownership (O), location (L) and internalization (I) advantages are the key drivers of FDI to their host countries. However, the Kojima theory assumes that the comparative advantage enjoyed by the host countries in terms of abundance of labour resources which consequently leads to low labour cost in these locations causes inflows of FDI. More importantly, the empirical front of this model anchors on the work of Abukakar and Abdulahi (2013), which relied on VAR model to investigate the determinants of inward FDI to Nigeria using natural resources, market openness, gross domestic product and number of phone lines as explanatory variables. However, this paper improved on the model by including exchange rate, unemployment rate and electricity generation as part of the explanatory variables. The model is formalized in a functional below:

FDI = f (DOM, OPN, EXT, UPR, ETG) (1)

Where: FDI = Foreign direct investment, DOM = Size of domestic market, proxy for gross domestic product, OPN = Market openness, EXT = Exchange rate, UPR = Unemployment rate and ETG = Electricity generation**.**

The configuration of the VAR model using notations of each of the variables is as follows:

$$\Delta InFDI_t = c_1 + \sum_{i=1}^{m} k_{11}\, \Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{12}\, \Delta InDOM_{t-i} + \sum_{i=1}^{m} k_{13}\, \Delta OPN_{t-i} + \sum_{i=1}^{m} k_{14}\, \Delta InEXT_{t-i} + \sum_{i=1}^{m} k_{15}\, \Delta UPR_{t-i} + \sum_{i=1}^{m} k_{16}\, \Delta InETG_{t-i} + V_{1t} \quad (2.1)$$

$$\Delta InDOM_t = c_2 + \sum_{i=1}^{m} k_{21}\,\Delta InDOM_{t-i} + \sum_{i=1}^{m} k_{22}\,\Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{23}\,\Delta OPN_{t-i} + \sum_{i=1}^{m} k_{24}\,\Delta InEXT_{t-i} + \sum_{i=1}^{m} k_{25}\,\Delta UPR_{t-i} + \sum_{i=1}^{m} k_{26}\,\Delta InETG_{t-i} + V_{2t} \quad (2.2)$$

$$\Delta OPN_t = c_3 + \sum_{i=1}^{m} k_{31}\,\Delta OPN_{t-i} + \sum_{i=1}^{m} k_{32}\,\Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{33}\,\Delta InDOM_{t-i} + \sum_{i=1}^{m} k_{34}\,\Delta InEXT_{t-i} + \sum_{i=1}^{m} k_{35}\,\Delta UPR_{t-i} + \sum_{i=1}^{m} k_{36}\,\Delta InETG_{t-i} + V_{3t} \quad (2.3)$$

$$\Delta InEXT_{t-1} = c_4 \sum_{i=1}^{m} k_{41}\,\Delta Inext_{t-i} + \sum_{i=1}^{m} k_{42}\,\Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{43}\,\Delta OPN_{t-i} + \sum_{i=1}^{m} k_{44}\,\Delta InDOM_{t-i} \sum_{i=1}^{m} k_{45}\,\Delta UPP_{t-i} + \sum_{i=1}^{m} k_{46}\,\Delta InETG_{t-i} + V_{4t} \quad (2.4)$$

$$\Delta UPR_t = c_5 + \sum_{i=1}^{m} k_{51}\,\Delta UPR_{t-i} + \sum_{i=1}^{m} k_{52}\,\Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{53}\,\Delta InDOM_{t-i} + \sum_{i=1}^{m} k_{54}\,\Delta OPN_{t-i} \sum_{i=1}^{m} k_{55}\,\Delta InEXT_{t-i} + \sum_{i=1}^{m} k_{56}\,\Delta InETG_{t-i} + V_{5t} \quad (2.5)$$

$$\Delta InETG_t = c_6 + \sum_{i=1}^{m} k_{61}\,\Delta InETG_{t-i} + \sum_{i=1}^{m} k_{62}\,\Delta InFDI_{t-i} + \sum_{i=1}^{m} k_{63}\,\Delta InDOM_{t-i} + \sum_{i=1}^{m} k_{64}\,\Delta InOPN_{t-i} \sum_{i=1}^{m} k_{65}\,\Delta InEXT_{t-i} + \sum_{i=1}^{m} k_{66}\,\Delta UPR_{t-i} + V_{6t} \quad (2.6)$$

Where: $C_1 – C_6$ = constant parameters, K_{11} - K_{66} = coefficient of the explanatory variables, Δ = First difference operator, In = Natural logarithm operator andV_{1t} -V_{6t} = random disturbance terms.

3.2. Method of Data Analysis

This paper utilized vector autoregressive (VAR) model to estimate the feedback effect among the variables under investigation. The choice of VAR methodology stems from its flexibility and easy application for the analysis of multivariate time series. As a measure of feedback effect, the VAR model provides basis for regressing each of the dependent variables on its own lag and lags of other explanatory variables included in the model. Additionally, the VAR – Granger causality test is conducted to determine the direction of causality between foreign direct investment and the explanatory variables included in the model. Specifically, for each of the above equations, the chi-square (X^2) distributed tests is undertaken to ascertain the direction of causality for each of the equations (2.1 - 2.6). The rationale for this test is based on the fact the hypotheses to be tested are jointly stated. Thus, evidence of causality is established if the null hypothesis is rejected given that the computed probability value (P-value) for the chi-square distributed value is less than or equal to 0.05, but if otherwise the null hypothesis cannot be rejected. More importantly some tests are conducted in the course of this study. The detailed explanations of these tests are provided below:

i. Unit root test: This test is conducted to ascertain whether the Ordinary Least Squares assumptions are violated. The Augmented Dickey-Fuller (ADF) test is utilized to determine whether the variables used in the model are stationary. The ADF model is expressed as:

$$\Delta F_t = \pi_0 + \pi_1 F_{t-1} + \sum_{i=1}^{j} \alpha_i \Delta F_{t-i} + \mu_t \quad (3)$$

Where: H_t = variables under investigation, $\pi_{0\,=\,\text{constant}}$ term, π_1 and α_i = parameter estimates

j = lag length, Δ= First difference operator and μ_t = stochastic term

ii. Cointegration test:

This cointegration test is used to ascertain whether or not long run equilibrium relationship exist between the variables. Specifically, the cointegration test for multivariate model proposed by Johansen and Juselius (1990) is utilized in this paper to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration at 5 percent level. The formalization of the log-likelihood ratio based on Trace and Max-Eigen statistics are as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} In\left(1-\hat{\lambda}_i\right) \quad (3.1)$$

$$\lambda_{\max}(r, r+1) = -T\, In\left(1 - \hat{\lambda} r+1\right) \quad (3.2)$$

where $\hat{\lambda}$ denotes the estimated values of the characteristic roots and T is the sample size. Basically, the Trace statistic tests the restriction r < q (q < n) against the completely unrestricted model r < n and the maximum Eigen value statistic makes the alternative more precise by specifying that only one additional cointegrating vector exists ($r \leq q + 1$). Notably, the critical values for both trace and Max-Eigen statistics have been calculated by Johansen and Juselius (1990). Evidence of at least one cointegrating vector at 5 percent indicates that the series have long run relationship.

4. Results and Discussions

4.1. Unit Root Test

The unit root test result for each of the series is reported in Table 1.

Variable	ADF statistics		Prob. Value		Order of integration
	Levels	1st difference	Levels	1st difference	
Log (FDI)	-1.92	-5.98	0.623	0.000	I (1)
Log (GDP)	-1.75	-8.45	0.708	0.000	I (1)
OPN	-2.42	-6.25	0.351	0.000	I (1)
Log (EXT)	-0.56	-5.89	0.970	0.000	I (1)
Log (ETG)	-0.56	-5.89	0.970	0.000	I (1)
UPR	-2.39	-5.76	0.373	0.000	I (1)

Table 1: ADF unit root test result
Source: Authors' Computation using Eviews 9

Table 1 shows the Augmented Dickey-Fullest test result for each of the series. It is observed that all the variables under review are stationary at first difference. This is a pointer that they are integrated of order one I (1). Hence, the null hypothesis that each of the series has a unit root is rejected at 5 percent level. The evidence of unit prompted the test for co-integration in order to validate the result.

4.2. Cointegration Test

The test for cointegration between the underlying series focused on Johansen and Juselius (1990) procedure. The outcome of the test is presented in Table 2.

Series: LOG(FDI) LOG(GDP) OPN LOG(EXT) LOG(ETG) UPR				
Trace test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.785511	142.9469	95.75366	0.0000
At most 1 *	0.568671	92.14351	69.81889	0.0003
At most 2 *	0.539786	64.39435	47.85613	0.0007
At most 3 *	0.485470	38.78428	29.79707	0.0036
At most 4 *	0.348834	16.85574	15.49471	0.0310
At most 5	0.078534	2.699043	3.841466	0.1004
Max-Eigen test				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.785511	50.80335	40.07757	0.0022
At most 1	0.568671	27.74916	33.87687	0.2253
At most 2	0.539786	25.61007	27.58434	0.0876
At most 3 *	0.485470	21.92854	21.13162	0.0386
At most 4	0.348834	14.15669	14.26460	0.0520
At most 5	0.078534	2.699043	3.841466	0.1004

Table 2: Result of Johansen Cointegration Test
Source: Authors' Computation using Eviews 9
*NB: * implies rejection of null hypothesis of no cointegrating equation at 5 percent level*

Table 2 shows the cointegration test result for the series. The Trace statistic indicates that there exist five cointegrating equations at 5 percent level while Max-Eigen statistic shows evidence of two cointegrating equations at 5 percent level. Following the confirmation of cointegrating equations, the null hypothesis of no cointegration equation is rejected at 5 percent level. Hence, long-run relationship equilibrium relationship exists among the variables

4.3. VAR Maximum Lag-Length Selection

The VAR model requires the selection of the maximum lag-length. The Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQ) were employed for the selection of the maximum lag-length. The result is reported in Table 3.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-273.4474	NA	0.913070	16.93621	17.20830	17.02776
1	-82.31977	301.1709*	7.84e-05*	7.534531*	9.439177*	8.175387*
2	-57.79762	29.72381	0.000198	8.230159	11.76736	9.420319
3	-21.18783	31.06286	0.000382	8.193202	13.36296	9.932666

Table 3: VAR lag order selection result
Source: Authors' Computation using E-views 9
*NB: * indicates lag order selected by the criterion*

From the result in Table 3, the lag order selected by AIC, SIC and HQ at 5 percent level is 1. Thus, the optimal lag length for the VAR model for this paper is 1.

4.4. Vector Autoregressive (VAR) Model Estimation

The VAR model estimated for this study provided an insight into the interactions among the underlying series. The estimated VAR model with FDI as the dependent variable is the focal point of the empirical analysis in this paper. The result is reported in Table 4.

Dependent variable: Log (FDI)	
Variables	Coefficients
Log(FDI(-1))	0.405**
Log [GDP(-1)]	0.184
OPN (-1)	-0.007
Log [EXT(-1)]	0.484
UPR (-1)	-0.005
Log [ETG (-1)	0.935
C	-0.23
Adj-R^2	0.9498
F-stat	88.385

Table 4: Estimated VAR Model
Source: Authors' Computation using Eviews 9
*Note: ** denotes significant at 5 percent level.*

From Table 4, it was observed that the unrestricted VAR model for FDI utilized one lag length for each of the explanatory variables and the dependent variable itself. The findings indicate that FDI lagged for one period is positively related to the current value of FDI and its coefficient is significant at 5 percent level. This is a pointer at FDI in the previous period a liable predictor of current FDI value. The first lags of GDP, EXT and ETG have insignificant positive influence on FDI during the study period. Contrarily, OPN and UPR lagged for one period negatively impacted on FDI in Nigeria between 1980 and 2015. The model is associated with high coefficient of determination of 0.949, indicating that 94.9 percent of the overall variations in FDI are explained by the jointly explained by the regressors. Evidence from the computed f-statistic reveals that the entire model is statistically significant at 5 percent level. This finding demonstrates that taken together, the explanatory variables significantly explained changes in FDI during the period studied.

4.5. VAR Granger Causality Test

In order to complement the estimated VAR model, the Granger Causality analysis is employed to examine the direction of causality between FDI and the outlined explanatory variables. The result of the Granger causality test is showed in Table 5.

Casualty	Lag order	Chi-square (X^2)	P-values	Conclusion
GDP → FDI	1	0.160	0.688	Cannot reject
FDI → GDP	1	1.841	0.174	Cannot reject
OPN → FDI	1	0.015	0.9001	Cannot reject
FDI → OPN	1	11.473	0.007*	Rejected
EXT → FDI	1	2.188	0.139	Cannot reject
FDI → EXT	1	0.514	0.473	Cannot reject
UPR → FDI	1	0.0045	0.946	Cannot reject
FDI → UPR	1	2.903	0.088***	Rejected
ETG → FDI	1	6.650	0.4198	Cannot reject
FDI → ETG	1	1.007	0.3154	Cannot reject
(GDP, OPN, EXT, UPR, and ETG) → FDI	5	10.1884	0.079***	Rejected

Table 5: VAR Granger causality test result
Source: Authors' Computation using Eviews 9
*NB: * and *** denote rejection of null hypothesis of no causality at 1 percent and 10 percent levels respectively.*

From Table 5, it is evident that the null hypothesis of unidirectional Granger causality running from each of the outlined variables to FDI cannot be rejected at 5 percent level. This implies that none of the variables does not individually Granger caused FDI. However, it was found that FDI Granger causes OPN and UPR at 1 percent and 10 percent levels respectively. Similarly, all the variables (GDP, OPN, EXT, UPR and ETG) jointly granger causes FDI at 10 percent level. This is an indication that collectively all the regressors have predictive power for FDI during the period studied.

4.6. Variance Decomposition Estimates

The variance deposition estimates are presented in percentage and they provide deeper insight into variations in a variable following its own shock and shocks in other variables in the model. Specifically, the variance decomposition for FDIalone for 8 years period is reported in Table 6 given that it is the thrust of this paper.

Period	Log (FDI)	Log (GDP)	OPN	Log (EXT)	UPR	Log (ETG)
1	100.10	0.00	0.00	0.00	0.00	0.00
2	92.221	0.603	0.01	1.97	0.20	0.97
3	90.30	1.41	0.05	5.04	0.34	2.84
4	84.43	2.09	0.13	8.05	0.36	4.91
5	79.36	2.60	0.25	10.71	0.33	6.71
6	68.39	3.35	0.69	17.33	0.29	9.92
7	65.61	3.45	0.84	19.28	0.28	10.51
8	63.11	3.49	0.99	21.13	0.27	10.98

Table 6: Variance decomposition estimates for FDI
Source: Authors' Computation using Eviews 9

From the variance decomposition result reported in Table 6, FDI accounted for 100 percent stocks in itself in the first period over the 8-year period. The share of exchange rate (EXT) for changes in FDI began to increase in the second period and remained the largest among other variables over the rest of the period. This is followed by electricity generation (ETG). The next variable is Gross domestic product (GDP) and it is closely followed by unemployment (UPR). However, the share of degree of openness for shocks in FDI is the least among the outlined variables. This suggests that openness to trade alone is inadequate to drive FDI inflows to Nigeria. Thus, it can be established from the above result that exchange rate (EXT) has the highest predictive power for FDI over the 10-year period.

4.7. Impulse Response Functions

Like the variance decomposition, the analysis of impulse response function focused on the result for FDI given that it is the major thrust of this study.

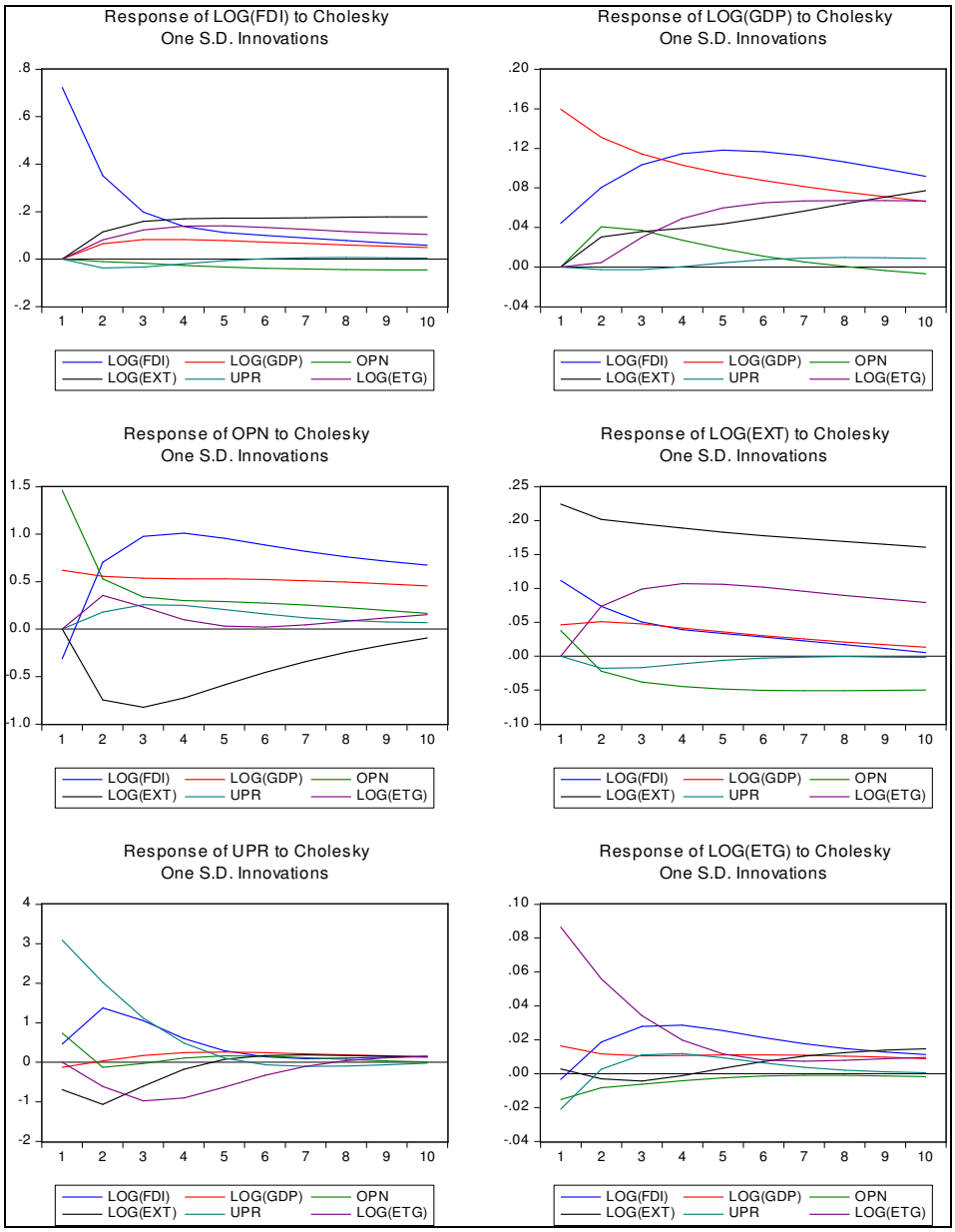

Figure 2: Plots depicting the impulse response function
Source: Authors' estimation using E-views 9

Figure 4 illustrates the impulse response function. From the uppermost left of the plot, it was observed that shock in FDI caused it to experience a negative growth from the first to the fourth period. FDI increased marginally in the fifth period due to its own stock. Again, shocks in GDP, EXT and ETG impacted positively on FDI during the 10 year period. Shocks in OPN and UPR caused FDI to decline initially, but FDI started to increase in the third period due to stock in these two variables.

5. Concluding Remarks and Policy Recommendations

The trajectory of FDI inflows to Nigeria motivated this study, which mainly focused on the empirical analysis of its policy and non-policy drivers. The findings provided a deeper understanding of the broad-based predictors of FDI in Nigeria between 1980 and 2015. Prominent among these drivers is the lagged value of FDI which was found to generate a significant positive influence on current FDI over the sampled period. This finding can be regarded as very intuitive, as FDI decisions in Nigeria seen to reflect an imitation of investment decisions of other firms. The causality test shows that joint causality runs from the underlying explanatory variables in the model to FDI. This is suggests that collectively provide the regressors are helpful in forecasting the dimension of FDI in Nigeria. However, previous FDI and exchange rate are identified as having the highest predictive power for FDI inflows to Nigeria. Hence, on the strengths of the findings, this paper recommends that government should ensure that the existing FDI are protected and offered necessary incentives in order to attract greater foreign investments into key sectors of the Nigerian economy. Additionally, policy makers and other relevant stakeholders should ensure that the Nigerian market size is expanded through continuous increase in the gross domestic product as it provides good signal to foreign investors.

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